

Appln. No. 10/613,555
Response to Office Action mailed May 12, 2006

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1. (previously presented) A steel sheet for a tension mask exhibiting excellent geomagnetic shielding properties, said steel sheet consisting essentially of lower than 0.1% by weight of C, lower than 0.2% by weight of Si, 0.4 to 2% by weight of Mn, not higher than 0.1% by weight of P, not higher than 0.03% by weight of S, not higher than 0.01% by weight of sol. Al, 0.003 to 0.02% by weight of N, and the balance of Fe, and having an anhysteretic magnetic permeability of 5,000 or higher, said steel sheet having a creep elongation of 0.50% or smaller, measured when said steel is maintained at a temperature of 450°C for 20 minutes with a tension of 300 N/mm² being applied to said steel sheet.

Claim 2. (original) The steel sheet for a tension mask according to claim 1, wherein said anhysteretic magnetic permeability is 5,200 or higher.

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Claim 3. (original) The steel sheet for a tension mask according to claim 1, wherein said anhysteretic magnetic permeability is 6,000 or higher.

Claim 4. (withdrawn) A method of manufacturing a steel sheet for a tension mask excellent in the shielding properties from geomagnetism, comprising the steps of:

obtaining a steel piece consisting essentially of lower than 0.1% by weight of C, lower than 0.2% by weight of Si, 0.4 to 2% by weight of Mn, not higher than 0.1% by weight of P, not higher than 0.03% by weight of S, not higher than 0.01% by weight of sol. Al, 0.003 to 0.02% by weight of N, and the balance of Fe;

hot rolling said steel piece;

cold rolling once or a plurality of times the hot-rolled steel sheet with or without an intermediate annealing treatment interposed between the adjacent cold rolling processes so as to prepare a steel sheet having a predetermined thickness; and

annealing the resultant steel sheet under a temperature region not higher than the recrystallization temperature so as to increase the anhysteretic magnetic permeability.

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Claim 5. (withdrawn) The method of manufacturing a steel sheet for a tension mask according to claim 4, wherein said annealing step is carried out under a temperature range between the recrystallization temperature and 510°C .

Claim 6. (withdrawn) The method of manufacturing a steel sheet for a tension mask according to claim 4, wherein said annealing step is carried out under a temperature range between the recrystallization temperature and 560°C.

Claim 7. (previously presented) A steel sheet for a tension mask exhibiting excellent geomagnetic shielding properties and excellent creep resistance under high temperatures, said steel sheet consisting essentially of lower than 0.1% by weight of C, lower than 0.2% by weight of Si, higher than 0.6% and not higher than 2% by weight of Mn, not higher than 0.1% by weight of P, not higher than 0.03% by weight of S, not higher than 0.01% by weight of sol. Al, not lower than 0.006% and lower than 0.01% by weight of N, and the balance of Fe, and having an anhysteretic magnetic permeability of 5,000 or higher, said steel sheet having a creep

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elongation of 0.50% or smaller, measured when said steel is maintained at a temperature of 450°C for 20 minutes with a tension of 300 N/mm² being applied to said steel sheet.

Claim 8. (original) The steel sheet for a tension mask according to claim 7, wherein said anhysteretic magnetic permeability is 5,200 or higher.

Claim 9. (original) The steel sheet for a tension mask according to claim 7, wherein said anhysteretic magnetic permeability is 6,000 or higher.

Claim 10. (withdrawn) A method of manufacturing a steel sheet for a tension mask excellent in both the shielding properties from geomagnetism and the creep resistance under high temperatures, comprising the steps of:

obtaining a steel piece consisting essentially of lower than 0.1% by weight of C, lower than 0.2% by weight of Si, higher than 0.6% and not higher than 2% by weight of Mn, not higher than 0.1% by weight of P, not higher than 0.03% by weight of S, not higher

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than 0.01% by weight of sol. Al, not lower than 0.006% and lower than 0.01% by weight of N, and the balance of Fe;

hot rolling said steel piece;

cold rolling once or a plurality of times the hot-rolled steel sheet with or without an intermediate annealing treatment interposed between the adjacent cold rolling processes so as to prepare a steel sheet having a predetermined thickness; and

annealing the resultant steel sheet under a temperature region not higher than the recrystallization temperature so as to increase the anhysteretic magnetic permeability.

Claim 11. (withdrawn) The method of manufacturing a steel sheet for a tension mask according to claim 10, wherein said annealing step is carried out under a temperature range between the crystallization temperature and 510°C.

Claim 12. (withdrawn) The method of manufacturing a steel sheet for a tension mask according to claim 10, wherein said

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annealing step is carried out under a temperature range between the recrystallization temperature and 560°C.

Claim 13. (currently amended) A steel sheet for a tension mask exhibiting excellent geomagnetic shielding properties, said steel sheet being manufactured by the method comprising the steps of:

obtaining a steel piece consisting essentially of lower than 0.1% by weight of C, lower than 0.2% by weight of Si, 0.4 to 2% by weight of Mn, not higher than 0.1% by weight of P, not higher than 0.03% by weight of S, not higher than 0.01% by weight of sol. Al, 0.003 to 0.02% by weight of N, and the balance of Fe;

hot rolling said steel piece;

cold rolling once or a plurality of times the hot-rolled steel sheet with or without an intermediate annealing treatment interposed between the adjacent cold rolling processes so as to prepare a steel sheet having a predetermined thickness; and

annealing the resultant steel sheet under a temperature region not higher than the recrystallization temperature so as to increase the anhysteretic magnetic permeability, said steel sheet

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having a creep elongation of 0.50% or smaller, measured when said steel is maintained at a temperature of 450°C for 20 minutes with a tension of 300 N/mm² being applied to said steel sheet.

Claim 14. (currently amended) A steel sheet for a tension mask exhibiting excellent geomagnetic shielding properties and excellent creep resistance under high temperatures, said steel sheet being manufactured by the method comprising the steps of:

obtaining a steel piece consisting essentially of lower than 0.1% by weight of C, lower than 0.2% by weight of Si, higher than 0.64 and not higher than 2% by weight of Mn, not higher than 0.1% by weight of P, not higher than 0.03% by weight of S, not higher than 0.01% by weight of sol. Al, not lower than 0.006% and lower than 0.01% by weight of N, and the balance of Fe;

hot rolling said steel piece;

cold rolling once or a plurality of times the hot-rolled steel sheet with or without an intermediate annealing treatment interposed between the adjacent cold rolling processes so as to prepare a steel sheet having a predetermined thickness; and

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annealing the resultant steel sheet under a temperature region not higher than the recrystallization temperature so as to increase the anhysteretic magnetic permeability, said steel sheet having a creep elongation of 0.50% or smaller, measured when said steel is maintained at a temperature of 450°C for 20 minutes with a tension of 300 N/mm² being applied to said steel sheet.

Claim 15. (currently amended) In a tension mask formed of a steel sheet, the improvement comprising the steel sheet consisting essentially of lower than 0.1% by weight of C, lower than 0.2% by weight of Si, 0.4 to 2% by weight of Mn, not higher than 0.1% by weight of P, not higher than 0.03% by weight of S, not higher than 0.01% by weight of sol. Al, 0.003 to 0.02% by weight of N, and the balance of Fe, and having an anhysteretic magnetic permeability of 5,000 or higher, said steel sheet having a creep elongation of 0.50% or smaller, measured when said steel is maintained at a temperature of 450°C for 20 minutes with a tension of 300 N/mm² being applied to said steel sheet.

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Claim 16. (currently amended) In a tension mask formed of a steel sheet, the improvement comprising the steel sheet consisting essentially of lower than 0.1% by weight of C, lower than 0.2% by weight of Si, higher than 0.6% and not higher than 2% by weight of Mn, not higher than 0.1% by weight of P, not higher than 0.03% by weight of S, not higher than 0.01% by weight of sol. Al, not lower than 0.006% and lower than 0.01% by weight of N, and the balance of Fe, and having an anhysteretic magnetic permeability of 5,000 or higher, said steel sheet having a creep elongation of 0.50% or smaller, measured when said steel is maintained at a temperature of 450°C for 20 minutes with a tension of 300 N/mm² being applied to said steel sheet.

Claim 17. (currently amended) A cathode ray tube comprising a tension mask formed of a steel sheet consisting essentially of lower than 0.1% by weight of C, lower than 0.2% by weight of Si, 0.4 to 2% by weight of Mn, not higher than 0.1% by weight of P, not higher than 0.03% by weight of S, not higher than 0.01% by weight of sol. Al, 0.003 to 0.02% by weight of N, and the balance of Fe, and having an anhysteretic magnetic permeability of 5,000

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or higher, said steel sheet having a creep elongation of 0.50% or smaller, measured when said steel is maintained at a temperature of 450°C for 20 minutes with a tension of 300 N/mm² being applied to said steel sheet.

Claim 18. (currently amended) A cathode ray tube comprising a tension mask formed of a steel sheet consisting essentially of lower than 0.1% by weight of C, lower than 0.2% by weight of Si, higher than 0.6% and not higher than 2% by weight of Mn, not higher than 0.1% by weight of P, not higher than 0.03% by weight of S, not higher than 0.01% by weight of sol. Al, not lower than 0.006% and lower than 0.01% by weight of N, and the balance of Fe, and having an anhysteretic magnetic permeability of 5,000 or higher, said steel sheet having a creep elongation of 0.50% or smaller, measured when said steel is maintained at a temperature of 450°C for 20 minutes with a tension of 300 N/mm² being applied to said steel sheet.

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Claim 19. (withdrawn) A method capable of improving a magnetic properties of a steel sheet for a tension mask, comprising the steps of preparing a cold-rolled steel sheet and annealing the cold-rolled steel sheet under a temperature region not higher than the recrystallization temperature so as to increase the anhysteretic magnetic permeability.